Remarks

Entry of this response and reconsideration of this Application are respectfully requested.

Upon entry of the foregoing amendment, claims 1-11 are pending in the application, with claims 1, 3 and 7 being the independent claims. Claims 1, 3 and 7 (all of the independent claims) are sought to be amended. The changes are believed to introduce no new matter, and entry is respectfully requested.

Based on the above amendment and the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Drawing Objection

A replacement sheet of drawing including Figure 6 appears at the end of this response. The replacement sheet includes the omitted reference numeral "615".

Rejections under 35 U.S.C. § 103

Independent Claim 1

The Examiner has rejected claim 1 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,537,551 to Denenberg *et al.* ("Denenberg") in view of U.S. Patent No. 6,438,123 to Chapman ("Chapman"). For the reasons set forth below, Applicants respectfully traverse.

Independent claim 1 (currently amended) recites a method for generating a data compression dictionary in a DOCSIS network. The method includes the steps of:

> i. identifying a plurality of frequently occurring data strings transmitted by a plurality of cable modems in the DOCSIS network;

ii. assigning a token to represent each one of the plurality of frequently occurring data strings;

iii. entering each one of the plurality of frequently occurring data strings and each token assigned to represent each one of the plurality of frequently occurring data strings into a lookup table to produce a data compression dictionary; and

iv. transmitting the data compression dictionary to the plurality of cable modems in the DOCSIS network during initialization of each of the plurality of cable modems.

The proposed amendment to claim 1 (and the other independent claims as well) helps to emphasize that the claimed inventions enhance the transmission efficiency of a network of cable modems, each of which may link to a variety of user devices. A compression dictionary is developed at a cable head end based on frequently repeated data strings in the payloads of PDU data packets from the cable modems. The latest version of the dictionary is pushed out to each cable modem each time it is initialized.

Applicant maintains that the combination of Denenberg and Chapman does not teach or suggest each and every feature of claim 1. For example, as will be discussed in more detail below, neither Denenberg nor Chapman teach or suggest "identifying a plurality of frequently occurring data strings transmitted by a plurality of cable modems in [a] DOCSIS network" or building a data compression dictionary based on such frequently occurring data strings or downloading the data compression dictionary at the time each modem is initialized as recited by claim 1.

As argued in the prior response, Denenberg is directed to a data compression method for use in an interactive network. Compression and de-compression look-up tables are constructed based on identifying and assigning code words to the 4K most frequently occurring byte pairs in the interactive network. *See, e.g.,* Denenberg at

column 14, lines 9-27. However, in identifying the 4K most frequently occurring byte pairs, Denenberg does not identify "frequently occurring data strings transmitted by a plurality of cable modems" as recited by claim 1 or at any other data transmitted by subscriber-side equipment in the network. Rather, Denenberg looks at "objects" generated by a service provider that are used to compose applications displayed at the subscriber monitors. In particular, the objects that are analyzed in Denenberg are those stored in caches of network concentrators within the interactive network:

> For a system such as PRODIGY, source characterization can best be done by sampling object usage. More specifically, this can be accomplished *by determining the identity and occurrence frequency of objects that have been stored at caches 46 of network concentrators 36* shown in FIG. 1. As will be recalled, objects are required to compose the applications displayed at subscriber monitors 54, and are supplied on demand from the various storage facilities within network 10; e.g., reception systems 40, caches 46 of concentrators 36, and main database 44 of host server 26.

Denenberg, column 14, lines 43-53 (emphasis added).

Thus, to the extent Denenberg builds a data compression dictionary, it does so based on "objects" that are generated by a service provider and cached during transmission to subscriber equipment (e.g., reception systems 40), which use the objects to compose applications for display on subscriber monitors. Denenberg's decision to looked at cached objects is premised on the observation that "the objects stored over time at concentrators 36, best reflect average service usage: i.e., demand by the subscriber population as represented by data traffic over lines 38." Denenberg, column 14, lines 53-56. In contrast, the invention of claim 1 builds a data compression dictionary based on frequently occurring data strings transmitted from subscriber-side equipment—namely, cable modems. This alternate approach is premised in part on the observation that

> [m]any packets normally transmitted in the upstream direction in a DOCSIS network contain identical ASCII character strings in the payload. Examples of these strings are "http://www.", "POP", "SMTP", "GET", and "PUT". The network could be used more efficiently if the payload of a given DOCSIS packet could be transmitted with fewer bytes.

Specification of present application, at paragraph [0016].

These are very different approaches to building a data compression dictionary. Denenberg's approach builds a data compression dictionary based on data transmitted from higher level elements in a network to the subscriber, while the invention of claim 1 builds a data compression dictionary based on data transmitted from the subscriber to higher level elements in the network. Consequently, Denenberg teaches away from "identifying a plurality of frequently occurring data strings transmitted by a plurality of cable modems in [a] DOCSIS network" and building a data compression dictionary based on such frequently occurring data strings and then pushing that data compression dictionary out to each cable modem at the time of initialization as recited by claim 1.

The foregoing shortcomings of Denenberg with respect to claim 1 are not remedied by combining the Denenberg teachings with those of Chapman. The Examiner points out that Chapman teaches transmitting and receiving compressed data by a plurality of cable modems. Applicant does not challenge that it is known to compress data and to transmit and receive compressed data via cable modems. Claim 1 is directed to a method particularly suitable for improving the transmission efficiency of network of cable modems communicating with a CMTS.

Chapman teaches a method of suppressing the headers of packets transmitted from a cable modem to a cable modem termination system (CMTS) in a DOCSIS network. The only references made to header compression (which are cited by the

Examiner), discuss why header suppression is a better technique that header compression. In any case, Chapman nowhere teaches or suggests compressing data based on a data compression dictionary, let alone building such a dictionary based on a plurality of frequently occurring data strings identified in transmissions originating from a plurality of cable modems in a DOCSIS network as recited in claim 1.

Since the combination of Denenberg and Chapman does not teach or suggest each and every feature of independent claim 1, the combination cannot render obvious that claim. Accordingly, Applicants respectfully request that the rejection of claim 1 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Independent Claims 3 and 7

The Examiner has rejected claims 3 and 7 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2002/0029206 A1 to Satoh *et al.* ("Satoh") in view of Denenberg and Chapman. For the reasons set forth below, Applicants respectfully traverse.

Independent claim 3 (currently amended) as presently amended recites a method for transmitting compressed data packets in a DOCSIS network. The method includes the steps of:

> i. receiving a plurality of data packets for transmission, wherein each of said data packets has a payload portion comprised of one or more data strings;
>
> ii. identifying which of said data packets has a payload portion that can be compressed;
>
> iii. for each of said data packets identified in said step (b), replacing each of said one or more data strings contained in said payload portion with a token from a data compression dictionary assigned to represent said one or more data strings, wherein said data compression dictionary is tuned to data transmitted by a plurality of cable modems on the DOCSIS network;

iv. appending a compression indicator to each of said tokens within each of said data packets; and

v. transmitting said data packets within a DOCSIS service identifier; and

vi. transmitting said data dictionary to each cable modem on the DOCSIS network when each said cable modem is initialized.

For reasons set forth above with respect to claim 1, neither Denenberg nor Chapman teach or suggest the use of a data compression dictionary constructed according to data transmitted by a plurality of cable modems on [a] DOCSIS network as recited by claim 3. As will be described in more detail below, Satoh does not provide the missing teaching or suggestion.

Satoh is directed to a system for data compression/decompression in which a "compressing dictionary use or non-use deciding unit" is used to decide whether or not data being stored or transmitted by a first computer to a second computer is compressed using a data compression dictionary. The determination of whether or not compression is applied is made based on the type of text being stored or transmitted. In Satoh, the compression dictionary is created based only on the contents of the data to be compressed. *See* Satoh at paragraph [0186] ("In the dictionary, a predetermined code is assigned to each character of a high probability of occurring in data to be compressed").

Thus, in Satoh, only a single source—namely, the data to be compressed for storage or transmission—is used to build the compression dictionary. Consequently, Satoh nowhere teaches or suggests performing data compression using a data

compression dictionary that "is tuned to data transmitted by a plurality of cable modems on the DOCSIS network" as recited by claim 3.

Since neither Denenberg, Chapman nor Satoh teach or suggest performing data compression using a data compression dictionary that "is tuned to data transmitted by a plurality of cable modems on the DOCSIS network" as recited by claim 3, that combination cannot render obvious that claim. Furthermore, none of these references suggest forming a data compression dictionary at the CMTS and pushing it out to each cable modem at the time of its initialization. Accordingly, Applicants respectfully request that the rejection of claim 3 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Independent claim 7 recites a method for expanding a PDU data string transmitted over a DOCSIS network. The method includes the steps of:

> i. receiving a plurality of data packets transmitted within a DOCSIS service identifier, wherein each of said data packets has a payload portion;
>
> ii. identifying each of said plurality of data packets having a compression indicator appended to one or more tokens within said payload portion; and
>
> iii. for each of said data packets identified in said step (b), replacing each of said one or more tokens contained within said payload portion with a data string assigned to represent said one or more tokens found in a data compression dictionary, wherein said data compression dictionary is tuned to data transmitted by a plurality of cable modems on the DOCSIS network and downloaded to each cable modem when it is initialized.

For reasons set forth above with respect to claim 1, neither Denenberg nor Chapman teach or suggest performing data decompression using a data compression dictionary as recited by claim 7. For reasons set forth above with respect to claim 3, Satoh does not provide the missing teaching or suggestion.

Since neither Denenberg, Chapman nor Satoh teach or suggest performing data decompression using a data compression dictionary that "is tuned to data transmitted by a plurality of cable modems on [a] DOCSIS network" as recited by claim 7, that combination cannot render obvious that claim. Accordingly, Applicants respectfully request that the rejection of claim 7 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Dependent Claim 2

The Examiner has rejected claim 2 under 35 U.S.C. § 103(a) as being unpatentable over Denenberg and Chapman in view of U.S. Patent No. 5,293,379 to Carr ("Carr"). Claim 2 incorporates the proposed changes to claim 1.

As explained above, the combination of Denenberg and Chapman do not render obvious independent claim 1 for at least the reason that neither references teaches or suggests "identifying a plurality of frequently occurring data strings transmitted by a plurality of cable modems in [a] DOCSIS network" or building a data compression dictionary based on such frequently occurring data strings as recited by claim 1. Carr does not provide the missing teaching or suggestion. Consequently, the combination of Denenberg, Chapman and Carr cannot render obvious independent claim 1. Claim 2 is likewise not rendered obvious by the combination of Denenberg, Chapman and Carr for the same reasons as independent claim 1 from which it depends and further in view of its own features. Accordingly, Applicants respectfully request that the rejection of claim 2 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Dependent Claim 10

The Examiner has rejected claim 10 under 35 U.S.C. § 103(a) as being unpatentable over Denenberg and Chapman in view of Satoh. Claim 10 incorporates the proposed changes to claim 1.

As explained above, the combination of Denenberg and Chapman do not render obvious independent claim 1 for at least the reason that neither references teaches or suggests "identifying a plurality of frequently occurring data strings transmitted by a plurality of cable modems in [a] DOCSIS network" or building a data compression dictionary based on such frequently occurring data strings as recited by claim 1. Satoh, which teaches building a data compression dictionary based only on the data which is to be compressed for storage or transmission itself, does not provide the missing teaching or suggestion. Consequently, the combination of Denenberg, Chapman and Satoh cannot render obvious independent claim 1. Claim 10 is likewise not rendered obvious by the combination of Denenberg, Chapman and Satoh for the same reasons as independent claim 1 from which it depends and further in view of its own features. Accordingly, Applicants respectfully request that the rejection of claim 10 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Dependent Claims 4, 5, 8 and 9

The Examiner has rejected claims 4, 5, 8 and 9 under 35 U.S.C. § 103(a) as being unpatentable over Satoh, Denenberg and Chapman in view of U.S. Patent No. 5,737,733 to Eller ("Eller"). For reasons set forth below, Applicants respectfully traverse.

Claims 4 and 5 incorporate the proposed changes to claim 3. Claims 8 and 9 incorporate the proposed changes to claim 7.

As explained above, the combination of Satoh, Denenberg and Chapman do not render obvious independent claim 3 for at least the reason that none of those references teach or suggest the use of a data compression dictionary tuned to "data transmitted by a plurality of cable modems on [a] DOCSIS network" as recited by claim 3. Eller does not provide the missing teaching or suggestion. Consequently, the combination of Satoh, Denenberg, Chapman and Eller cannot render obvious independent claim 3. Claims 4 and 5 are likewise not rendered obvious by the combination of Satoh, Denenberg, Chapman and Eller for the same reasons as independent claim 3 from which they depend and further in view of their own respective features. Accordingly, Applicants respectfully request that the rejection of claims 4 and 5 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

As further explained above, the combination of Satoh, Denenberg and Chapman do not render obvious independent claim 7 for at least the reason that none of those references teach or suggest performing data decompression using a data compression dictionary that "is tuned to data transmitted by a plurality of cable modems on [a] DOCSIS network" as recited by claim 7. Eller does not provide the missing teaching or suggestion. Consequently, the combination of Satoh, Denenberg, Chapman and Eller cannot render obvious independent claim 7. Claims 8 and 9 are likewise not rendered obvious by the combination of Satoh, Denenberg, Chapman and Eller for the same reasons as independent claim 7 from which they depend and further in view of their own respective features. Accordingly, Applicants respectfully request that the rejection of claims 8 and 9 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Dependent Claim 6

The Examiner has rejected claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Satoh, Denenberg and Chapman in view of U.S. Patent No. 5,530,645 to Chu ("Chu"). Claim 6 incorporates the proposed changes to claim 3.

As explained above, the combination of Satoh, Denenberg and Chapman do not render obvious independent claim 3 for at least the reason that none of those references teach or suggest the use of a data compression dictionary tuned to "data transmitted by a plurality of cable modems on [a] DOCSIS network" as recited by claim 3. Chu does not provide the missing teaching or suggestion. Consequently, the combination of Satoh, Denenberg, Chapman and Chu cannot render obvious independent claim 3. Claim 6 is likewise not rendered obvious by the combination of Satoh, Denenberg, Chapman and Eller for the same reasons as independent claim 3 from which it depends and further in view of its own features. Accordingly, Applicants respectfully request that the rejection of claim 6 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Dependent Claim 11

The Examiner has rejected claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Denenberg and Chapman in view of U.S. Patent No. 6,078,955 to Konno *et al.* ("Konno"). Claim 11 incorporates the proposed changes to claim 1.

As explained above, the combination of Denenberg and Chapman do not render obvious independent claim 1 for at least the reason that neither references teaches or suggests "identifying a plurality of frequently occurring data strings transmitted by a plurality of cable modems in [a] DOCSIS network" or building a data compression dictionary based on such frequently occurring data strings as recited by claim 1. Konno does not provide the missing teaching or suggestion. Consequently, the combination of

Denenberg, Chapman and Konno cannot render obvious independent claim 1. Claim 11 is likewise not rendered obvious by the combination of Denenberg, Chapman and Konno for the same reasons as independent claim 1 from which it depends and further in view of its own features. Accordingly, Applicants respectfully request that the rejection of claim 11 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Glenn J. Perry
Attorney for Applicants
Registration No. 28,458

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1100 New York Avenue, N.W.
Washington, D.C. 20005-3934
(202) 371-2600

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